

Real-time Assessment: Ecological Momentary Assessment

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Goals

- Intellectual streams leading to real-time assessment
- Fundamentals of Real-time assessment
- What it's like
- What we can expect to learn from the application of Real-time assessment
- Foreshadow next two days

■ Look for: **Presenter**

“Streams”

- Memory processes in self-reports
- Context effects
 - Immediate impact of environment
- Interest in understanding within-day phenomena
 - Diurnal rhythms
 - Finer resolution of temporal associations
 - Stress, coping, outcomes
 - Treatments and pain
 - Acute effects of naturally-occurring event or experimental interventions
 - Time allocation
 - How people spend their time

Fundamentals of Real-Time Assessments

■ Ambulatory Monitoring

- Usually physiological measures
 - Cardiovascular (EKG,BP,HR); respiration; glucose; GSR; activity; peak-flow devices; multi-modal monitors
 - Rationale for sampling not always clear

■ Experience Sampling

- Focus on subjective experience
- Usually random sampling

■ Ecological Momentary Assessment

- Includes self-report and physiological
- Three formal characteristics:
 - Immediacy; Sampling framework; Ecological validity

Fundamentals of Real-Time Assessments

1. Immediate Assessment

- To eliminate or
reduce memory
bias

■ However....

- Often immediate
- Last 5 minutes
- Last 30 minutes
- Since the last “beep”
 - For complete coverage
 - Event-driven
- Last 24 hours
- Conceptual decision based on
evaluation of memory bias

Fundamentals of Real-Time Assessments

2. Sampling Framework

3. Ecological Validity

Selected General Readings

- DeVries, 1991
 - Focus on psychopathology
- Stone, Kessler, & Haythorthwaite, 1991
 - “How-to issues” in daily diaries
- Stone & Shiffman, 1994
 - Defined EMA
- Delespaul, 1995
 - Detailed description of ESM
- Affleck, Zautra, Tennen, & Ameli, 1999
 - Daily process designs for clinical psychology
- Reis & Gable, 2000
 - Review of diary studies
- Tennen & Affleck, 2002
 - Daily processes in social and clinical psychology
- Stone & Shiffman, 2002
 - “Guidelines” for real-time write-ups
- Bolger, 2003
 - Review of daily diary field
- Special journal issues
 - *Journal of Personality*
 - *Annals of Behavioral Medicine*
 - *Health Psychology*

What's it like?

Daily Diaries

- Popular, convenient
- A specialized form of real-time assessment
- Many studies
- But.....
 - Self-selected context
 - Single portion of day
 - 24-hour; recall bias may be a problem for many measures

What's it like?

Modality of data collection

■ Sampling **Shiffman**

- End-of-day → lengthy
- Throughout-the-day → brief

■ Paper-and-pencil **Hufford**

- Common
 - Compliance
 - Readability

■ Electronic diary

- Palmtop computers
- Time-date stamp
- Branching

■ Signaling devices

- Ambulatory monitors
- Pagers
- Watches
- Electronic diaries

■ Alternatives

- IVR
- Web-based
- Audio-monitoring

What's it like?

Content

■ Situational characteristics

- Where are you?
- What are you doing?
- Who are you with?

■ Affective state

- Mood assessment
- Depression, anxiety, fatigue

■ Targeted content

- Symptoms
- Behaviors
- Subjective states
- Physiological variables
- Cognitive performance

■ Often standardized from one study to the next

What's it like?

Practicalities

■ How often?

- 1 to 60 times per day
- 1 to 100s of days

■ How many questions?

- 1 to 30
- But branching possible with electronic diaries & IVR

■ What sorts of schedules?

- Random **Shiffman**
- Event-driven
- Combined

■ Can people do it? **Hufford**

- YES
- All kinds

■ How do they feel about doing it?

- Fine, most of the time

■ Does doing it affect their answers? **Hufford**

- Probably not

■ Are there problems?

- Some **Jamner**

What do we learn from Real-time studies?

- Reliable between-person estimates
- Estimates of within-person variability and change, and individual differences in them
- Causal analysis of within-person associations and, individual differences in them

Reliable Estimates

- Clinical trial of a new medication; RCT
- Changes in pain levels at baseline and follow-up is primary outcome
- Choice:
 - Recall of pain for the last month
 - Daily monitoring of pain for the last month
- Why Real-time?
 - Validity
 - Reliability

Reliable Estimates

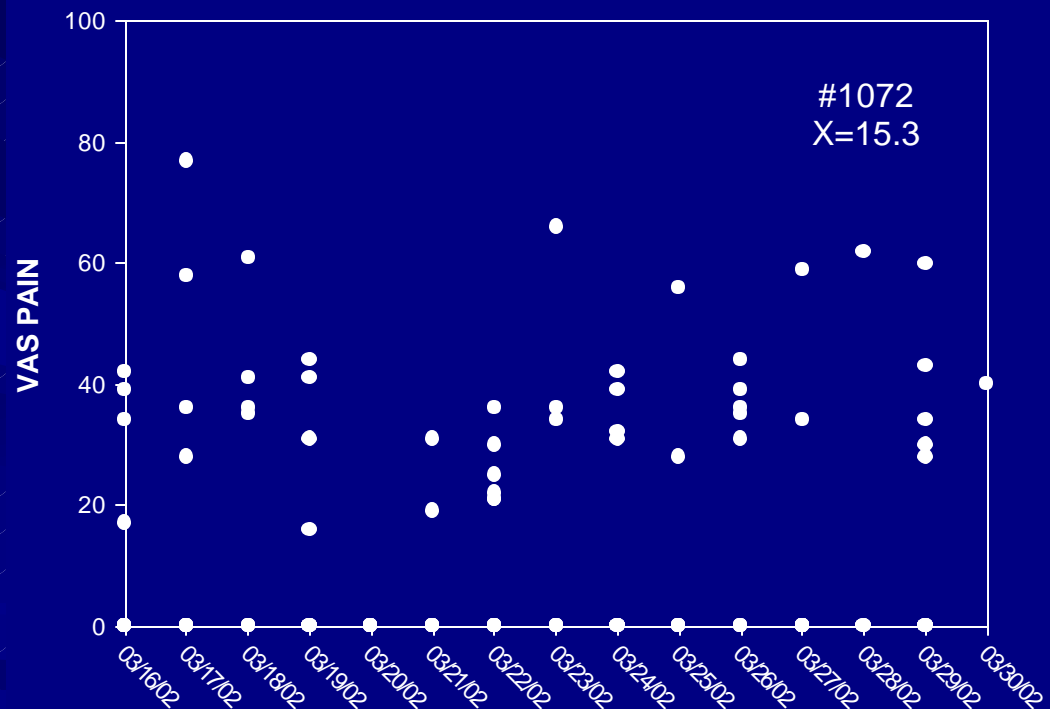
- *Paradoxically*, measures based on recall data may be less variable
 - Recall processes may lead to consistent reporting and lower variability
- *Furthermore*, increased validity of real-time measures may not always strengthen effects based on recall data
 - Biasing of recall outcomes may overestimate treatment effects, e.g., side-effects and semantic memory

Within-person variability and change

- Multiple observations enable fine-grained resolution of phenomena
 - We actually don't know very much about people's everyday lives or their symptoms
- Conditional associations
 - Day of week
 - Time of day
 - Micro environment

Within-person variability and change

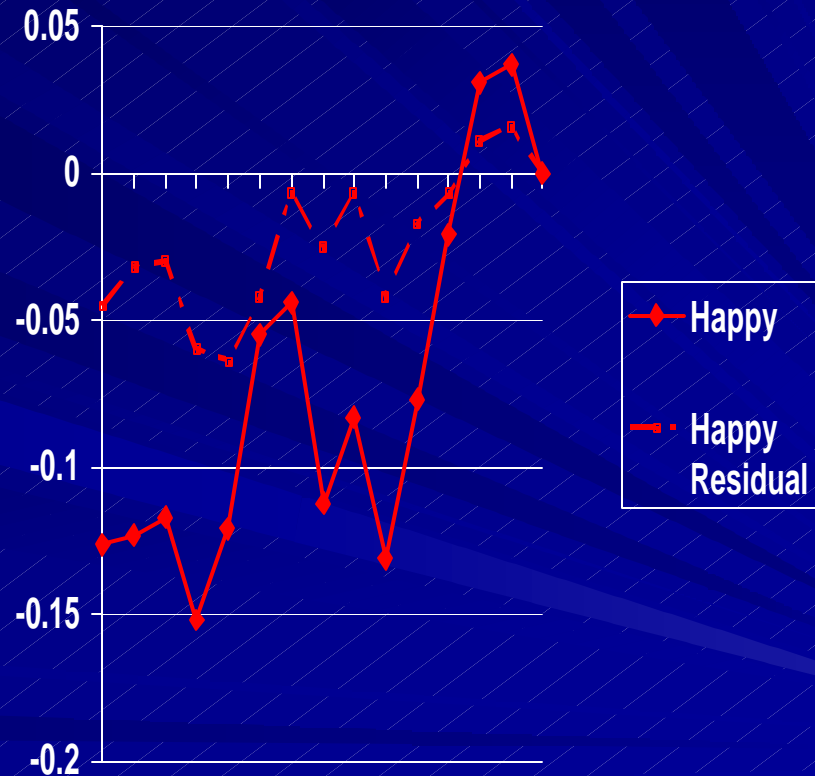
- Multiple observations enable fine-grained resolution of phenomena
- We often believe things are stable when they are not



Within-person variability and change

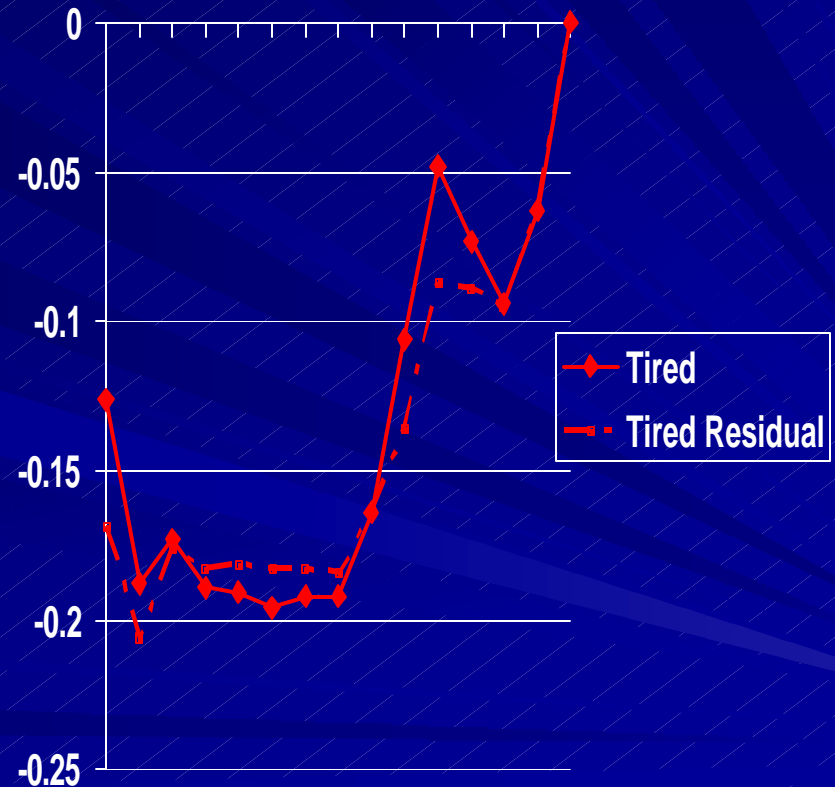
■ Diurnal patterns of affect

- Detecting
- Understand environmental contributions



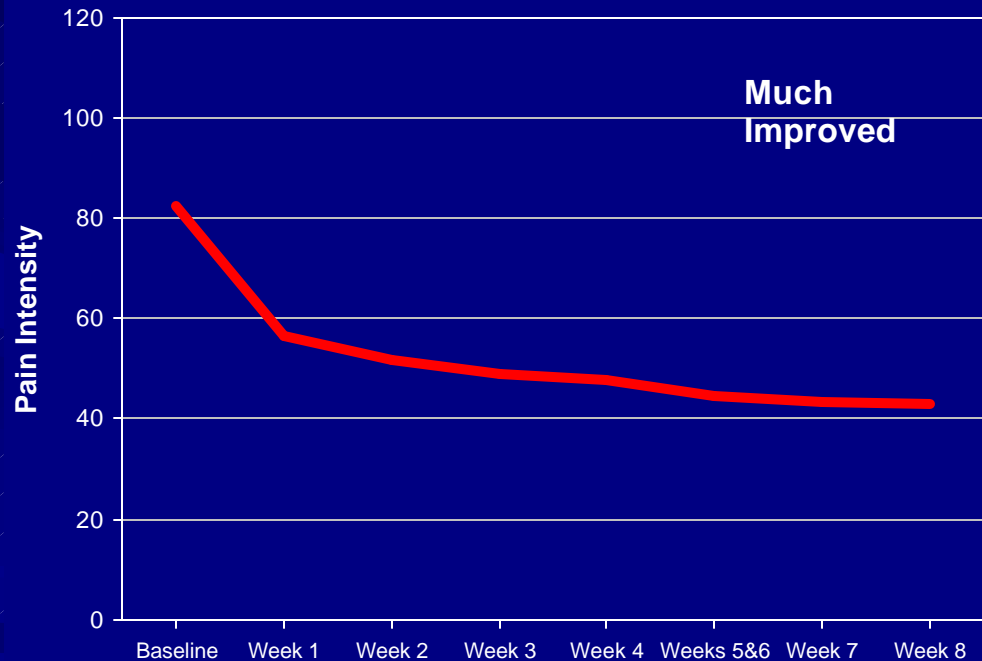
Within-person variability and change

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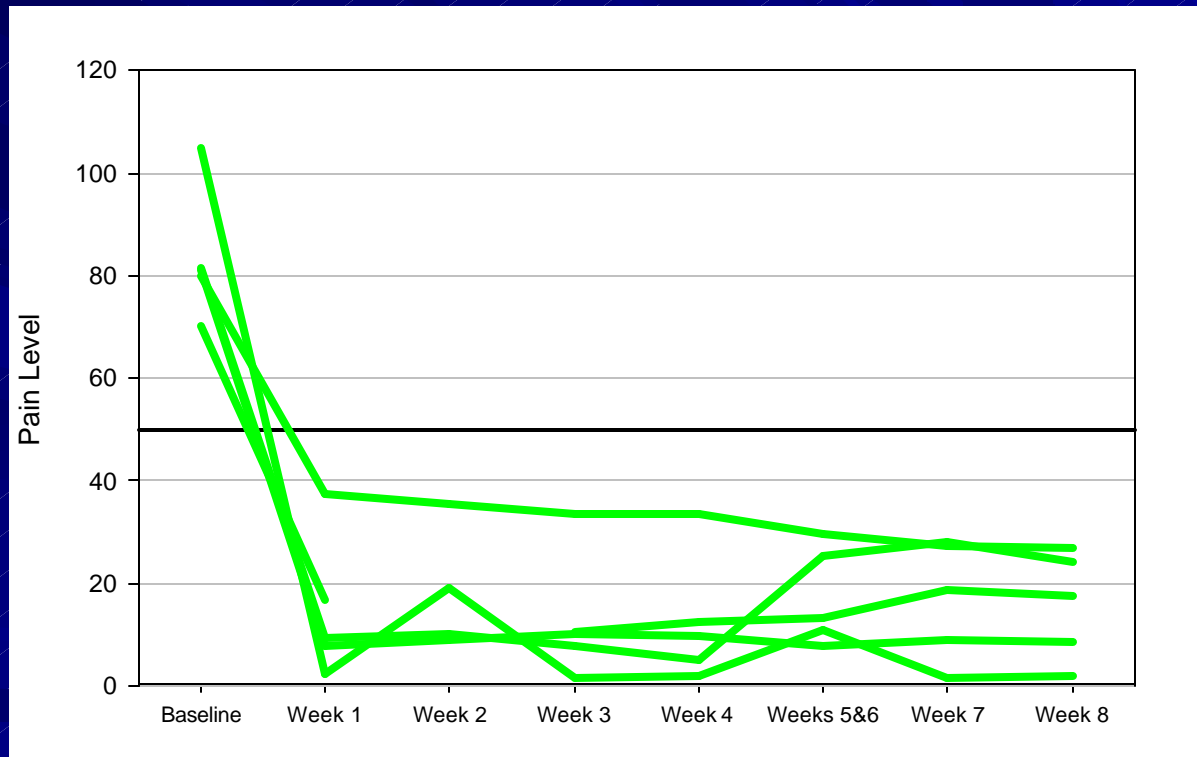
Within-person variability and change

- Expanding our understanding of important phenomena that we already think we understand
 - Example: the meaning of Global Impression of Change measures in clinical trials



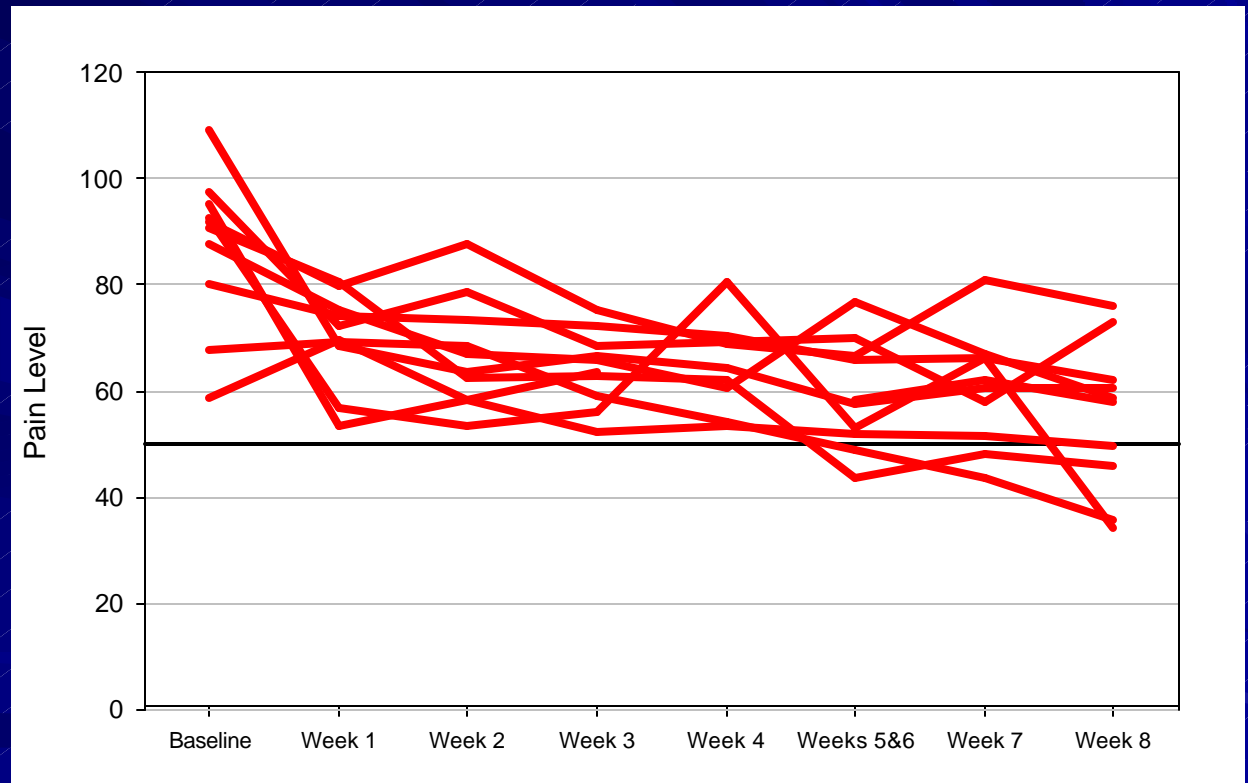
Within-person variability and change

- Real-time data add a new dimension to our understanding
- Diary ratings aggregated by week
- Some of the participants



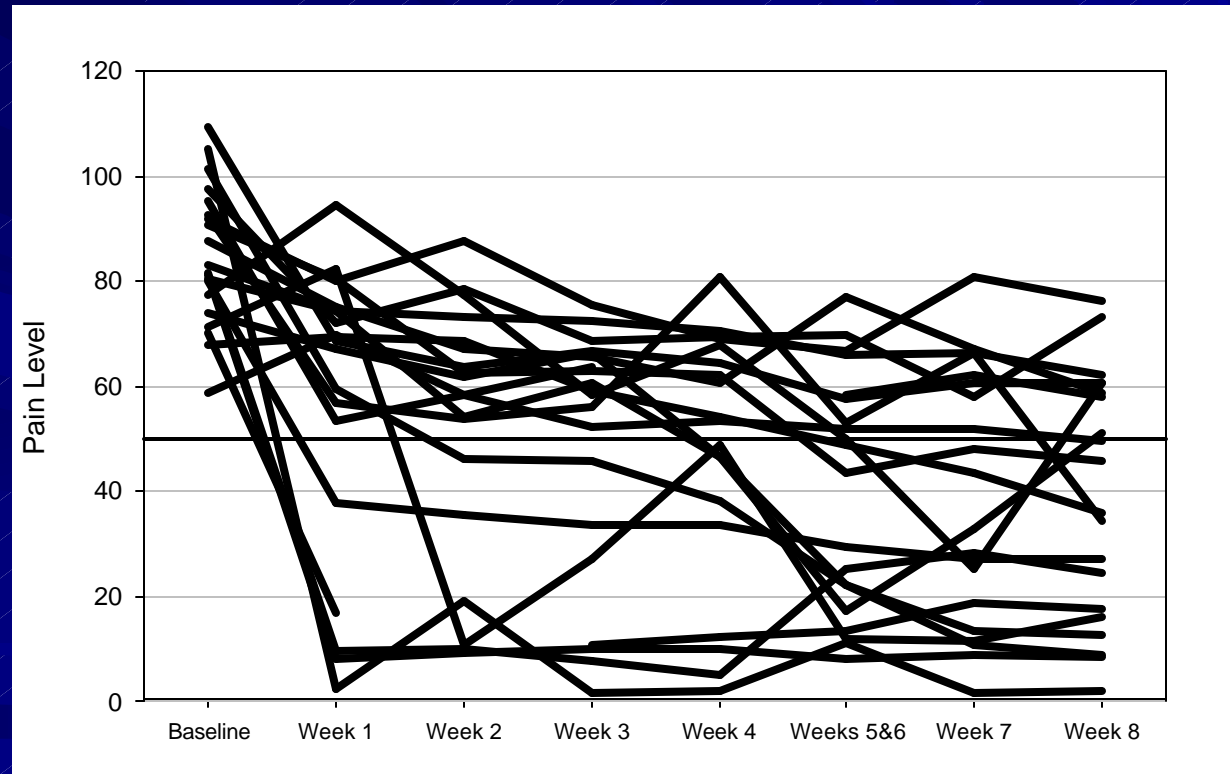
Within-person variability and change

■ But here are some other participants



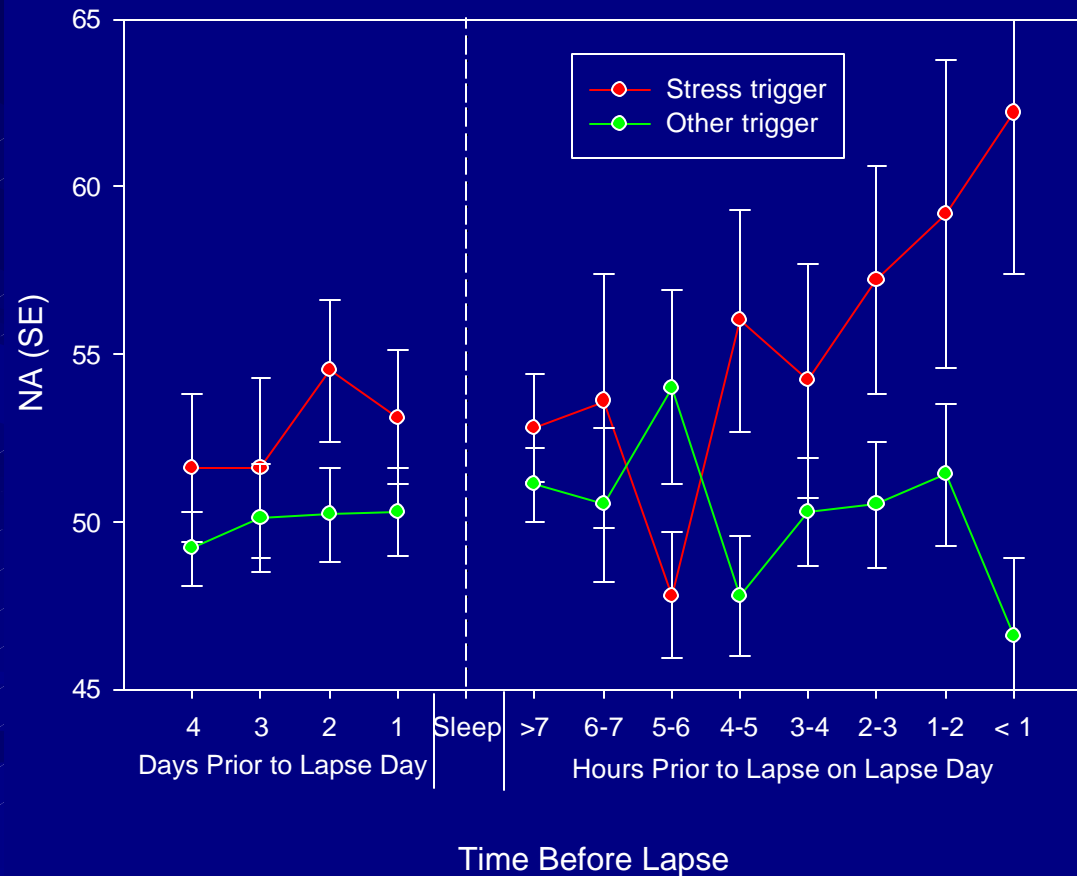
Within-person variability and change

- All participants
- Real-time data has expanded our understanding of the change process
 - Some change a lot, quickly
 - Others change a little



Causal Associations

- Exploit clear temporal association to derive “near-” causal explanations
- Usually observational in nature
- But they could be experimental



Causal Associations

Selected Reactivity Examples

- Reactivity of genetically vulnerable individuals (schizophrenic parent) to within-day stressors
 - Vulnerable individuals more reactive to negative events
 - Myin-Germeys, Archives of General Psychiatry, 2002
- Reactivity of HPA-axis to within-day stressors
 - Salivettes to collect saliva for bioassay
 - Higher cortisol when stressed
 - Psychosomatic Medicine, 1995

Summary

- Real-time data collection is a useful tool that enables novel study designs providing a detailed record of phenomena in real-life settings
- It is not for everyone and every situation
 - Many questions do not require this level of detail
 - Many questions are not challenged by self-report bias
 - Costs, burdens, and expertise are considerations
- It is an evolving methodology
 - New technologies will shape the future of real-time data collection
 - Unresolved concerns – to be addressed throughout conference